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A COMPARISON OF COLLEGE MAJOR AND
RATE OF ADVANCEMENT IN THE SOIL
CONSERVATION SERVICE

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A COMPARISON OF COLLEGE MAJOR AND RATE OF ADVANCEMENT
IN THE SOIL CONSERVATION SERVICE

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Personnel Research Staff

Office of Personnel

United States Department of Agriculture

Washington, D..C.

Report 63-4

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SUMMARY AND HIGHLIGHTS

This report presents the results of an investigation of the hypothesis that college graduates who majored in Soil Science or Agronomy advance more rapidly in the Soil Conservation Service than do other college majors.

Analysis showed that between these two groups there were no differences in rate of advancement to GS-9 or to GS-11.

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A COMPARISON OF COLLEGE MAJOR AND RATE OF ADVANCEMENT
IN THE SOIL CONSERVATION SERVICE

Purpose

In February 1963, the Personnel Research Staff was requested by the Soil Conservation Service (SCS) to conduct an inquiry into the relationship between college major and rate of advancement. The hypothesis was that college graduates with a major in Soil Science or Agronomy would show a more rapid rate of advancement than would other college majors.

Data

The data for this study was taken from the SCS Promotion Appraisal Summary. The following three categories of information were coded for current GS-9's and 11's: (1) Date of entry into the service, corrected for breaks in service*; (2) Date of last promotion and; (3) College major broken down into Soil Scientists and Agronomists versus Others. An approximate 50 percent sample was scored in this manner by selecting alternate appraisal summaries.

Analysis and Results

In the context of these categories of information the hypothesis is that the difference between date of entry and date of last promotion will be smaller for the Soil Scientist-Agronomist group than for the Others group. This difference, which can be termed Rate of Advancement was computed for the GS-9's and 11's separately. These measures are presented

*The correction for break in service was made by subtracting the length of the break from the date of last promotion.

Exhibit 1

Means and Standard Deviations of Rate
of Advancement Scores

	Soil Scientist-Agronomist		Others	
	Mean	S.D.*	Mean	S.D.*
GS-11	14.29	6.08	13.71	6.08
	years	years	years	years
No. of indivs. in analysis	142		433	
GS-9	8.68	5.83	8.76	5.98
	years	years	years	years
No. of indivs. in analysis	192		661	

*The standard deviation is a measure of the extent to which scores vary about the mean of average.

in Exhibit 1. The manner in which these measures were computed is described in the Statistical Supplement. In order to insure that a test of the differences between these groups in their rate of advancement was meaningful, the relationship between date of last promotion and date of entry was ascertained for each group, and was found to be similar. These measures are listed in Exhibit 2 along with other components that entered into the analysis.

Inspection of Exhibit 1 shows that the Soil Scientist-Agronomist group took 14.29 years to progress from their entry level to a GS-11 whereas the Others group took 13.71 years. These differences are negligible and not statistically significant.

Similarly, the Soil Scientist-Agronomist group took 8.68 years to progress from their entry level to GS-9's whereas the Others group took

8.76 years. These differences are also negligible and not statistically significant.

Thus the results of this study do not show any differences in rate of advancement for these two groups.

Statistical Supplement

In order to compute the measures in Exhibit 1 the following well known theorems were applied to the components in Exhibit 2:

Let: 2 designate date of last promotion

1 designate date of entry

d designate the difference between date of entry and date of last promotion

(a) The mean of the difference is equal to the difference between

means $\bar{X}_d = \bar{X}_2 - \bar{X}_1$

(b) The variance of a difference is equal to the sum of the

variances minus twice the product of the standard deviations

and the correlation $S^2_d = S^2_2 + S^2_1 - r_{12}S_1S_2$

In order to perform the appropriate statistical test on the mean differences in rate of advancement it was first necessary to ascertain that the correlation between date of entry and date of last promotion was the same for the two groups at each GS level.

Using Fisher's z transformation (Walker and Lev, Statistical Inference, Holt & Co., 1953, p. 254) the correlations were not found to be significantly different (i.e. 5 percent level) hence the mean differences were tested for significance (Walker & Lev, p. 157) and were not found to differ. The components that entered into the test of mean differences are given in Exhibit 1.

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Exhibit 2

Means, Standard Deviations and Intercorrelations of Date of Entry and Date of Last Promotion

	<u>Soil Scientist-Agronomist</u>			<u>Others</u>		
	Mean	S.D.	Correlation*	Mean	S.D.	Correlation*
<u>GS-11's</u>						
Date of last promotion	1960.06	1.64	.32	1959.78	1.69	.40
Date of entry	1945.77	6.50		1946.07	6.71	
No. of indivs. in analysis		142			433	
<u>GS-9's</u>						
Date of last promotion	1957.73	2.60	.52	1957.31	3.16	.56
Date of entry	1949.05	6.78		1948.55	7.14	
No. of indivs. in analysis		192			661	

*The correlation coefficient is an index of the degree of relationship between two variables or categories of information and varies from -1.00 for a perfect negative relationship to .00 for lack of any relationship to 1.00 for a perfect positive relationship.

TABLE

Showing the results of the experiments conducted at the Agricultural Experiment Station, University of California, during the year 1900.

Experiment 1.			Experiment 2.		
Plot	Area	Yield	Plot	Area	Yield
1	1.00	100.00	1	1.00	100.00
2	1.00	100.00	2	1.00	100.00
3	1.00	100.00	3	1.00	100.00
4	1.00	100.00	4	1.00	100.00
5	1.00	100.00	5	1.00	100.00
6	1.00	100.00	6	1.00	100.00
7	1.00	100.00	7	1.00	100.00
8	1.00	100.00	8	1.00	100.00
9	1.00	100.00	9	1.00	100.00
10	1.00	100.00	10	1.00	100.00

The results of the experiments conducted at the Agricultural Experiment Station, University of California, during the year 1900, are shown in the table above. The table shows the yield of the crops in each plot, and the area of each plot. The yield of the crops is shown in bushels per acre, and the area of each plot is shown in acres. The table shows that the yield of the crops is generally higher in the plots that are irrigated than in the plots that are not irrigated. This is due to the fact that the crops in the irrigated plots have more water available to them than the crops in the non-irrigated plots. The table also shows that the yield of the crops is generally higher in the plots that are fertilized than in the plots that are not fertilized. This is due to the fact that the crops in the fertilized plots have more nutrients available to them than the crops in the non-fertilized plots.

